

## CHAPTER 2

### OVERVIEW OF COASTAL SHORE PROTECTION PROJECTS

2-1. Classification. Coastal shore protection projects are classified into four general categories in the "Shore Protection Manual:"

- a. Shoreline stabilization.
- b. Backshore protection (from waves and surge).
- c. Inlet stabilization.
- d. Harbor protection.

A coastal problem may fall into one or more categories.

2-2. Alternatives. Once the project is identified, various alternatives are available to the coastal engineer. These alternatives involve the placement or removal of sediment, rock, wood, or other material to create new structures, to modify existing structures, or to physically alter the shore in some manner. In this manual, potential alternatives have been grouped into three categories: protective beaches, dunes, and levees; man-made structures; and nonstructural alternatives (Table 2-1). While this manual primarily addresses these three action alternatives, information presented will also be useful in evaluating passive solutions such as coastal zoning and land-use management. Dredging, a potential solution to inlet stabilization problems, and environmental considerations for this activity are addressed in EM 1110-2-1202 (see para 1-4). Mitigation policy for Federal projects is summarized in ER 1105-2-50. Chapter 8 of this manual provides an additional discussion of mitigation.

2-3. Considerations.

- a. Table 2-2 lists the factors that must be considered in analyzing each project category and its associated considerations. Hydraulic considerations include wind-generated waves, swells, currents, tides, storm surge or wind setup, and the basic bathymetry of the area. Sedimentation considerations include the littoral material and processes (i.e., direction of movement, net and gross rates of transport, and sediment classification and characteristics), and changes in shore alignment. Control structure considerations include the selection of the protective works by evaluating type, use, effectiveness, economics, and environmental impact. Navigation considerations include the design craft or vessel data, traffic lanes, channel depth, width, length, and alignment. In selecting the shape, size, and location of shore protection works, the objective should be not only to design an engineering work that will accomplish the desired results most economically, but also to consider effects on adjacent areas. An economic evaluation includes the maintenance and replacement costs, along with the interest on and the amortization of the first costs. If any plan considered would potentially increase the

TABLE 2-1

Classification of Coastal Engineering Solutions

<u>Problems to Address</u>	<u>Solutions</u>
Shore Stabilization	Beach & Dune  Beach nourishment Sand bypassing  Structures  Bulkheads Revetments Seawalls Detached breakwaters Groins  Nonstructural  Marsh plants Seagrasses
Backshore Protection	Beach & Dune  Protective beach Dune stabilization  Structures  Bulkheads Revetments Seawalls
Inlet Stabilization	Structures  Jetties Dredging
Harbor Protection	Structures  Breakwaters Jetties

TABLE 2-2

Classification of Coastal Engineering Considerations

PROJECT	CONSIDERATIONS										
	HYDRAULICS	SEDIMENTATION	CONTROL STRUCTURE	MAINTENANCE	REPLACEMENT	MATERIAL SOURCES	LEGAL REQUIREMENTS	ECONOMICS	ENVIRONMENTAL IMPACT	NAVIGATION	BAY CIRCULATION
SHORE STABILIZATION											
BACKSHORE PROTECTION											
INLET STABILIZATION											
HARBOR PROTECTION											

impact of a project to a larger coastal stretch or prevent an extension of the impacts, the economic effect of each such consequence should be evaluated. A convenient measurement for comparing various plans on an economic basis is the average annual cost over the evaluation period and the average annual benefit captured by each plan.

b. Effects on adjacent land areas are considered to the extent of providing the required protection with the least amount of disturbance to current and future land use, ecological factors, and aesthetics of the area. The form, texture, and source of material should be considered in the design, as well as how the material is used. Proper consideration must be given to the legal and social consequences where shore protection measures may result in significant effects on physical or ecological aspects of the environment.

c. Coordination between the design and environmental elements should begin early in the planning process to assure that environmental concerns, opportunities, and features are adequately considered.